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A CASE

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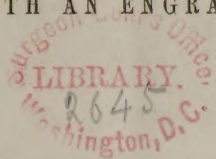
Amputation at the Shoulder-Joint.

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WITH AN ENGRAVING.



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A CASE
OF
AMPUTATION AT THE SHOULDER-JOINT.
WITH REMARKS.

AMPUTATION at the shoulder-joint, though sufficiently common in military surgery, and not very infrequent in civil hospitals, is an operation but rarely performed by the private practitioner. But 26 cases* in all have thus far been in this country fully reported; and of these only about 20 occurred in private practice. The following report will afford to the list an additional case.

James Doughty, of Brunswick, Maine, aged 66, of sanguine temperament, good muscular development, active habits, and in good health at the time, accidentally discharged a common musket while in the act of getting over a fence on the 11th of March, 1845, and thus produced the following injury to his right arm. The muzzle of the gun being within three or four inches of his shoulder at the moment, as he had placed the breech upon the ground while still himself upon the fence,

* As shown in an able and interesting paper in the January (1853) No. of this Journal, by the Junior Editor.

the whole charge (of shot) passed directly through the arm; entering on the inside just above the insertion of the deltoid, and passing obliquely backwards, upwards, and outwards, so as to emerge directly below the acromion process, and, in its course, shattering about two inches in length of the os humeri into minute fragments. The entering wound was circular, and corresponded in size with the calibre of the gun, being nearly an inch in diameter. The outer wound was of a circular outline, but very ragged at its edges, of a conical form, (the base being at the surface,) and was three inches in diameter externally, or large enough to have received a teacup of ordinary size; several ounces of muscle, with some portions of bone, having been blown out by the discharge. Above the shivered portion of the os humeri, the head and about three-fourths of an inch of the shaft still remained in their place.

Drs. Lincoln and Ellis were at once summoned to the patient, and I also saw him about three-quarters of an hour after the accident occurred. I found its precise nature and extent to be such as has been described. The patient was then in a state of collapse, and very cold; his pulse almost imperceptible, his teeth chattering, and his countenance pallid and anxious. The pain in the region of the injury was not however severe, so long as the part was kept perfectly at rest. The hemorrhage had been moderate, but still continued, he having lost probably not more than twenty ounces of blood. I assured myself that the anterior circumflex artery, as well as the brachial, had been divided.

It was unanimously decided that the only chance for the patient lay in amputation of the limb at the shoulder-joint; and I decided to perform it as soon as the necessary arrangements could be made, and the indications of commencing reaction were established.

The patient was, however, more than half a mile from home, and must be removed that distance over a rough road, on a bleak chilly day. This experience on his part was not calculated to hasten the reaction desired, or to arrest the hemorrhage. Every thing possible for his comfort was however arranged, and he arrived at his own house at about 5 o'clock P. M.—the accident having occurred one and a half hour pre-

viously. Soon afterwards the pulse and temperature of the surface began to rise, and at half-past 5 o'clock the operation was performed, with the assistance of Drs. Lincoln and Ellis, and Dr. J. B. Upham, now of Boston. The reaction had been promoted by dry fomentations and the administration of laudanum; which had been so frequently given that he had taken not less than one ounce during the time which had elapsed between the accident and the operation—as I afterwards ascertained. None but the best effects, however, ensued; his previous habits having been (as his medical attendants understood,) such as to render him not a stranger to the effects of stimulants.

So much of the soft parts near the shoulder had been removed, as has been seen, that only a very small and irregular anterior flap could be formed. The parts also which were needed for a posterior flap were blown out so extensively as not to allow the formation of a flap sufficiently wide to cover the lower part of the wound in that direction. And yet the flaps must be anterior and posterior, so far as the material to form them might be obtained.

A catlin was therefore passed through from the inner edge of the deltoid, at a point two inches below the joint, and out at the edge of the external wound, and a very small anterior flap was thus made. The knife was then carried through the joint, and a posterior flap made of the skin and triceps muscle, extending nearly half way to the elbow. This flap, however, was barely long enough to meet the other in the middle, and was so narrow at the part opposite to the two openings made by the passage of the charge, and where so much skin and muscle had been carried away, that only about three-fourths of the whole wound left after the extremity was removed could be closed and covered, on adjusting the flaps in the best possible manner. The subclavian artery was compressed by Dr. Ellis during the operation; and about four ounces of blood were lost. No anæsthetic was used, except the laudanum; as Dr. Morton's discovery was not made till more than a year subsequent to this time.

About one-fourth of the wound was left uncovered, for the reason before mentioned, on adjusting the flaps as well as

could be done by means of sutures and adhesive straps. A compress with a cold water dressing was alone applied over the straps; this to be kept constantly moist by dropping water upon it, as required, from a sponge. Reaction, commencing before the operation, was well established within an hour after it; and the patient was left for the night.

March 15.—Patient slept well the night after the operation, and each night since. Has had a good appetite, no febrile reaction, and been very comfortable in all respects, except, as the weather is very severe, and the house not very comfortable at best, he has suffered somewhat from the coldness of his room. The wound is now (ninety-six hours after the operation), dressed for the first time. It looks well, only a slight degree of suppuration having become established. The simple water dressing was still reapplied, and the patient kept on nutritious but simple diet as before; and no medicine was advised, except a laxative as required from time to time, till suppuration was thoroughly established, when the sulphate of quinine in small doses was administered.

On the ninth day after the operation—up to which time all things progressed well—the patient was attacked with erysipelas on the upper flap, and a good deal of febrile excitement ensued. This disease continued for ten days, and during its continuance extended over every part of the patient's body *excepting the wound itself*, which it never actually invaded at all. During this attack the patient was supported on sulphate of quinine and beef broth; and common wheaten flour was locally applied to the inflamed surface alternately with a lotion, of which laudanum formed a considerable part.

Subsequently to the disappearance of the erysipelas all things returned to the previous desirable state. Though the suppuration was profuse, the patient steadily recovered upon beefsteak and brandy, and sulphate of quinine as required; and first walked out on the 25th of April, (fifty-four days after the operation.) The wound soon afterwards closed, and he remained in usual health till nearly the time of his death, (which occurred from dysentery, I think,) in the summer of 1851.

In April, 1847,—two years after the operation—the patient presented himself before the Medical Class of Bowdoin College,

to give an opportunity for examination of the cicatrix and stump, of which a drawing was then made. The accompanying engraving gives an accurate idea of the appearance of the parts at that time. The axillary artery was felt pulsating directly under the skin just three-fourths of an inch from the anterior extremity of the cicatrix, at the point indicated by the cross.

Remarks.—Considering the admitted severity of this operation, the age of the patient, and his former habits, the preceding result was hardly to be expected; especially since a long process of granulation and exhausting suppuration was necessitated to repair the solution of continuity, while his poverty confined him to an uncomfortable room, and prevented him from receiving the best care and attendance after the operation. The appearance of erysipelas also, on the 9th day was regarded as a new element of danger in his case; and much febrile reaction and general irritation ensued. It was, however, singular that it did not invade the wound, nor change the secretion in the least, except over a small space at the top; though it extended entirely over every other part of his surface. The local application before mentioned, sulphate of quinine in small doses, with an occasional dose of pil. mass. hydrarg., followed by castor oil, was the only treatment resorted to, during its continuance. Subsequently, he was sustained for weeks by wine and quinine, with beef broth and beefsteak, and the usual accompaniments. A more minute examination of the elements of this case, will, however, perhaps enable us to account for the successful result in circumstances at first view apparently so unfavorable.

I. In the first place, I believe both the relative and the absolute danger of this operation have been generally overrated. The Hospital Statistics adduced in the valuable paper alluded to in the commencement of this report, lead to the conclusion that it is more hazardous than amputation of the arm or even of the thigh. The after treatment, however, has so much influence on the success of severe amputations, that comparisons of results in hospitals of different countries, though in regard to the same operation, are not to be relied upon. Indeed, to obtain reliable results, either as to the comparative dan-

ger of different operations, or the absolute danger of any particular one, we must confine our observations to the same hospital or at least to those in which the same general method, both of operation and of after treatment, is adopted. It is well known that all serious operations are less successful in the French than in the English hospitals; the after treatment, in my own opinion, accounting mainly for the difference. Consequently, we find* that in France $72\frac{2}{5}$ per cent. die after amputation at the shoulder-joint; in this country $53\frac{1}{3}$ per cent.; and in Great Britain only $39\frac{1}{4}$ per cent. This would make it appear a more dangerous operation than amputation of the thigh, and far more so than amputation of the arm. But on the other hand, it appears† that in Paris alone, 50 per cent. only of the amputations of the shoulder-joint prove fatal; just the same proportion of amputations of the arm,—and only 20 per cent. of amputations of the thigh being so—making the last far the least hazardous of the three operations, and the other two equally dangerous.

But the favorable must also be distinguished from the unfavorable cases, even in the same Hospital. The second series of reports of cases in the New-York Hospital (p. 15), makes the percentage of deaths, after this operation, nearly twice as great as the first does, and that of death after amputation of the thigh, more than two and a half times as great; while, according to the first series, amputation at the shoulder, and according to the second, amputation of the thigh, is the most fatal of the three. Until, therefore, the cases favorable for the amputation are distinguished from those not so, and, having done this, we compare the results of this amputation with those of the other two in the same hospital, or hospitals similarly conducted so far as the after treatment is concerned—statistics in regard to the absolute or the comparative danger of this operation cannot be relied upon.

No reason is apparent on general grounds why this operation should be essentially more dangerous than amputation of the arm near the joint, and I should consider it altogether less dangerous than amputation of the thigh. If it be said that there is greater danger of secondary hemorrhage in case of

* Page 13, of the paper alluded to.

† Page 15.

amputation at the shoulder, there exists no proof at all of such an assertion,* nor is it probable on either anatomical or physiological grounds. If it be said that union does not occur as rapidly in favorable circumstances, there is here also an equal deficiency both of proof and of probability. So far as sloughing of the stump is concerned—it is probably less likely to occur in this than in either of the other two cases, as it is nearer the centre of the circulation. For the present, then, the writer risks the opinion that this operation is in itself not essentially more hazardous than amputation of the arm, and is decidedly less so than that of the thigh.

II. The hemorrhage which preceded the amputation had, it is believed, a favorable influence. It is often stated in reports that *only* a certain number of ounces of blood was lost, as if the least possible loss were always desirable. In regard to an *anæmic* patient, this is doubtless a correct idea. But in case of a perfectly *healthy* and vigorous patient it is not so. In such a patient, as much blood should be lost, at least, as is constantly circulating in the limb before its removal, otherwise the patient is left in a state of actual plethora, to some extent, in consequence of the operation; a state not to be desired, certainly, when still other causes predisposing to inflammation exist. Even more blood than this indeed should be lost, in order to reduce, to some extent, the amount remaining in the vessels, and thus to diminish the risk of subsequent inflammation. Now I find the upper extremity of a well developed male weighing 150 lbs., when removed by amputation at the shoulder joint, weighs, if deprived of blood as far as may be, somewhat over five lbs. or one-thirtieth part of the whole body. But estimating the whole amount of blood in such a subject at 30 lbs., as is usual (one-fifth the weight of the body), the weight of the whole body *without* the blood is reduced to 120 lbs.; and the arm, weighing as just explained, will constitute one-twenty-fourth of the whole weight, and be entitled therefore to $1\frac{1}{4}$ lbs. blood. It is, however, impossible to remove

* The axillary artery was divided in this instance, just above the origin of the circumflex arteries; it appeared to be closed up, in the cicatrix, as far as to the origin of the subscapular.

all the blood from the capillaries and the minute vessels of the limb, even by amputation during life. But if we suppose even a quarter of a pound to remain, it will still follow that one pound should be allowed to flow from the artery during the operation, in order to maintain undisturbed the equilibrium of the circulation. True, this is merely an approximate result. But when we consider also the propriety of still farther depletion for the reason before mentioned, we conclude that the loss of at least one pound, and probably even $1\frac{1}{2}$ lb. of blood, is desirable in the case of a healthy and vigorous adult, who is the subject of this operation. This last amount was lost by Doughty, as nearly as could be estimated.

Nor is this principle less important in obstetrics than in surgery. The perfectly healthy (and generally somewhat plethoric) parturient female should lose from one to two lbs. of blood at least, in parturition, in order to be in the best possible condition for a convalescence without accidents; and I have believed myself able to trace febrile excitement, and even actual as well as threatened metro peritonitis, to too slight a degree of hemorrhage, in the circumstances specified. The explanation of this, will occur to any one conversant with the state of the uterus and the nutrition of the foetus before and immediately after parturition. I need not perhaps repeat that I am not here speaking of *anæmic* subjects.

Interesting also in this connection is the fact stated by Richerand, that the removal of one of the lower extremities sometimes entirely changes the temperament of patients; those becoming subsequently energetic and active who were previously languid and inefficient. A more plethoric or at least less anæmic state, and an increased fulness of flesh, accompany this change; the forces subservient to nutrition being relatively increased by the diminution of the mass to be nourished.

III. Nor was the danger of the operation essentially increased by the age of the patient, provided he were in perfect health at the time, and had not yet manifested the signs of senile decay. In both these respects he was in a good condition; and his subsequent progress showed that his previous habits had not essentially impaired his constitution. And here I would also insist, as essential to the reliability of statistics

respecting all severe operations, that they include only those cases in which the patients are in a state of good health at the time.

In regard to this and all other serious amputations it may be remarked, that those which have been necessitated by gunshot accidents are, as a class, the most valuable for statistical purposes, since these generally occur to persons in health at the time. In this way indeed we account for the comparatively slight danger from amputation at the shoulder-joint in military surgery. The article before quoted states the fact that Larrey (*Memoirs of Military Surgery*) had operated successfully on the battle-field in ninety out of somewhat over a hundred cases; and Mr. Guthrie operated successfully in eleven cases out of fourteen. In all these cases the operation was, however, performed before febrile reaction was established—was the *primary* operation as it is called. The *secondary* operation was fatal in the English army during the Peninsular war in fifteen cases out of nineteen; for here a disease is superadded to the operation, and to both combined the patient is very likely to succumb. This view of the subject would seem to set the question conclusively at rest, as to the propriety of ever performing the secondary operation, when it can be decided in season to perform the primary, that the amputation cannot be avoided.*

This amputation therefore, other things being equal, will succeed better in private practice when necessitated by accidents from firearms, than when by disease of the limb. And in this class of cases probably the operation would be found to be as successful in private as in military practice. Malignant disease, on the other hand, affords almost a presumption of a fatal result.

There is however another class of injuries too frequently of late requiring amputations in private practice, which are not to be classed with gunshot injuries in the respect now under consideration; I allude to *railroad accidents*. The comparative ill success of amputation after severe railroad accidents has been very generally overlooked. They most frequently befall

* The late Dr. M'Clellan of Philadelphia performed this operation six times, and always successfully. *Ubi supra*, p. 12.

persons in good health, as the employés upon the roads are the most frequent victims; and yet subsequent accidents, especially irritative fever, sloughing of stumps, and secondary hemorrhage, are very common. There is often in this class of accidents, a concussion of the whole body not common in gunshot injuries, and which indeed a musket ball can never produce. This induces a state of collapse from which the reaction is usually of a low grade, and the state which Travers calls "prostration with excitement," (and which is better termed "incomplete reaction,") ensues. This is a state most unfavorable for recovery from an operation, and the irritative fever accompanying it is well known to be in itself often productive of fatal effects even in cases where there is no local injury.

But another cause of the doubtful success of amputations after railroad accidents, is to be found in the fact that the vast force and the rude violence which produce the local injury, render it altogether more extensive than it at first appears to be. For example, the leg is crushed just above the ankle by the wheel of a railroad car, and two inches above the point where the force was applied, every thing appears perfectly sound. And yet, if the limb be amputated at that point, very likely the stump will slough because all the soft parts under the skin were, for a considerable extent, either killed or nearly deprived of their vitality, at first; or, very possibly, secondary hemorrhage will ensue from a similar unsuspected injury to the artery. Still neither of these conditions can be discovered by any external examination at the time; and the normal appearance of the skin, as it will usually be less extensively injured, is well calculated to mislead us. Governed by these facts, in a case precisely like the one just supposed, I amputated at "the place of election," as it is called; and found on examination of the part removed that though the skin was uninjured for more than an inch above the injury of the bone, the muscles were dead and black to a point only an inch below that selected for amputation, in front; and behind two and a half inches below it. In another case, the anterior half of the foot was crushed in a similar manner, the remaining portion being apparently uninjured. Wishing to save the

rest of the foot if possible, and still apprehending that if I performed Chopart's operation at once, I should be obliged to amputate a second time, from sloughing of the stump, I decided to wait two or three days till it should become apparent whether the deep seated parts implicated in this operation were actually dead or not. At the end of three days, patches of mortification had appeared in the skin just below the malleoli, and there ceased to extend upwards. The next day I performed the supra-malleolar operation, and the patient, like the last-mentioned, made a rapid recovery. On examination of the part removed, the whole of the skin and superficial fascia were found entirely detached from the deep fascia and tendons, and could be removed like a high shoe, on making a circular incision just below the malleoli. The muscular fibres also of the foot throughout, were black and gangrenous. In a third case, I amputated the arm, though the injury appeared not to extend above the middle of the forearm; and here also was able to demonstrate the propriety of so doing. But I need not multiply illustrations of the principle inculcated by these facts; which is that *in cases of railroad injuries requiring amputation, allowance must be made in selecting the part for the operation, for a greater extent of injury to the deeper parts than is at first indicated by external appearances.*

IV. The occurrence of erysipelas on the ninth day, and its continuance for ten days, might have proved a serious complication had the patient been in bad health previously—had he not lost a sufficient amount of blood before, and in connection with the operation—and had active depletory medication, especially active cathartics, been adopted to meet it. The patient being, however, in a good condition, in other respects, and this being, in my opinion, essentially a self-limited disease in its duration in any particular part, (though not, of course, in its extent,) it was believed to be a principal object to sustain his strength. But as not medicine, but appropriate nutriment, properly digested and assimilated, is the only known source of vital force, the treatment resolved itself into two elements: keeping the digestive organs in the best possible condition, and giving bland but very nutritious food. The sulph. quinine, and, when required, blue pill followed by ol. ricini fulfilled the first indication, and the beef broth the second.

And can any thing more than this be accomplished in any common case of erysipelas in the way of internal medication? Violent cathartics, whether mercurial or otherwise, are generally very injurious; and none at all are required unless indicated by the state of the alvine secretions, and which are, however, almost invariably deranged at the commencement of the attack. I have substituted the tinct. ferri muriat. for the sulph. quinine in this disease, for a few years past, and believe it not only acts as well as a tonic, but, even more than that remedy, modifies the capillary circulation, and thus prevents the extension of the inflammation. Fifteen to even twenty-five drops may be given to an adult, every three or four hours; and it is not contra-indicated by delirium, (even as in erysipelas of the scalp or face,) nor by a pulse of 120 or more. But neither these, nor any other remedies which I have seen administered internally, have any decided apparent effect, in abridging the duration of the disease in the part first affected. It will continue a week at least, and usually about ten days, even though it remains confined to a small surface.

Of *local* applications, the nitrate of silver, and some others, will sometimes prevent its extending, but generally will *not*. The patient's comfort is, however, essentially augmented by such applications as will exclude the air, and also cool the surface, if there is a sense of excessive heat, or diminish the sensibility if there is much pain.

V. But though the patient triumphed over all other opposing circumstances, he would probably have succumbed to the profuse suppuration which ensued, had it not been for the judicious and assiduous attentions of Dr. Lincoln, his attending physician. Although himself still more advanced in life than the patient, and incessantly pressed at the time by his professional duties, he nevertheless visited him twice or thrice daily, for several weeks in succession, frequently also purchasing for him the food best calculated to sustain him; and this with a certainty that no pecuniary compensation would be rendered. And while I feel a pleasure in recording the successful termination of this case, I enjoy at least an equal gratification in recognizing, here, the generous conduct by which it was finally secured.

